

CRYSTAL OSCILLATOR (Programmable)
SPREAD SPECTRUM
OUTPUT: CMOS



Product Number
X1G005281xxxx00

SG-9101CGA

- Frequency range : 0.67 MHz ~ 170 MHz (1 ppm Step)
- Supply voltage : 1.62 V ~ 3.63 V
- Function : Output enable (OE) or Standby (ST)
- Down or Center spread modulation
- Configurable spreading
 - 3 modulation profile (Hershey-kiss, Sine-wave, Triangle),
 - 4 modulation frequency, 6 spread percentage
- Package : 2.5 x 2.0 (mm)
- PLL technology to enable short lead time
- AEC-Q100 compliant



Specifications (characteristics)

Item	Symbol	Specifications				Conditions/Remarks	
Supply voltage	V _{CC}	1.80 V Typ. 1.62 V to 1.98 V		2.50 V Typ. 1.98 V to 2.20 V	3.30 V Typ. 2.20 V to 2.80 V		
Output frequency range	f _o	0.67 MHz to 170 MHz					
Storage temperature range	T _{stg}	-40 °C to +125 °C				Storage as single product.	
Operating temperature range	T _{use}	-40 °C to +125 °C					
Frequency tolerance ^{*1}	f _{tol}	±100 × 10 ⁻⁶				Average frequency of 1s gate time.	
Current consumption	I _{CC}	3.5 mA Max.	3.6 mA Max.	3.7 mA Max.	3.8 mA Max.	T _{use} = +125 °C	No load, f _o = 20 MHz
		3.4 mA Max.	3.5 mA Max.	3.6 mA Max.	3.7 mA Max.	T _{use} = +105 °C	
		2.9 mA Typ.		3.0 mA Typ.	3.2 mA Typ.	T _{use} = +25 °C	
		5.8 mA Max.	6.1 mA Max.	7.0 mA Max.	8.4 mA Max.	T _{use} = +125 °C	No load, f _o = 170 MHz
		5.7 mA Max.	6.0 mA Max.	6.9 mA Max.	8.3 mA Max.	T _{use} = +105 °C	
		4.9 mA Typ.		5.9 mA Typ.	7.0 mA Typ.	T _{use} = +25 °C	
Output disable current	I _{dis}	3.5 mA Max.	3.5 mA Max.	3.6 mA Max.	3.8 mA Max.	T _{use} = +125 °C	OE = GND, f _o = 170 MHz
		3.4 mA Max.	3.4 mA Max.	3.5 mA Max.	3.7 mA Max.	T _{use} = +105 °C	
Standby current	I _{std}	2.3 µA Max.	2.5 µA Max.	3.0 µA Max.	4.2 µA Max.	T _{use} = +125 °C	ST = GND
		0.9 µA Max.	1.0 µA Max.	1.5 µA Max.	2.5 µA Max.	T _{use} = +105 °C	
		0.3 µA Typ.	0.4 µA Typ.	0.5 µA Typ.	1.1 µA Typ.	T _{use} = +25 °C	
Symmetry	SYM	45 % to 55 %				50 % V _{CC} Level	
Output voltage (DC characteristics)	V _{OH}	90 % V _{CC} Min.				I _{OH/IOL} Conditions [mA]	
						Rise/Fall time	V _{CC}
	Default (f _o > 40 MHz), Fast	I _{OH}	-2.5	-3.5	-4.0	-5.0	
		I _{OL}	2.5	3.5	4.0	5.0	
Default (f _o ≤ 40 MHz)	I _{OH}	-1.5	-2.0	-2.5	-3.0		
	I _{OL}	1.5	2.0	2.5	3.0		
Slow	I _{OH}	-1.0	-1.5	-2.0	-2.5		
	I _{OL}	1.0	1.5	2.0	2.5		
							*A : 1.62 V to 1.98 V, *B : 1.98 V to 2.20 V, *C : 2.20 V to 2.80 V, *D : 2.70 V to 3.63 V
Output load condition	L _{CMOS}	15 pF Max.					
Input voltage	V _{IH}	70 % V _{CC} Min.				OE or ST	
	V _{IL}	30 % V _{CC} Max.					
Rise and Fall time	Default Fast Slow	tr/tf	3.0 ns Max.		f _o > 40 MHz		20 % - 80 % V _{CC} L _{CMOS} = 15 pF
			6.0 ns Max.		f _o ≤ 40 MHz		
			3.0 ns Max.		f _o = 0.67 MHz ~ 170 MHz		
			10.0 ns Max.		f _o = 0.67 MHz ~ 20 MHz		
Disable Time	t _{stp}	1 µs Max.		Measured from the time OE or ST pin crosses 30 % V _{CC}			
Enable Time	t _{sta}	1 µs Max.		Measured from the time OE pin crosses 70 % V _{CC}			
Resume Time	t _{res}	3 ms Max.		Measured from the time ST pin crosses 70 % V _{CC}			
Start-up time	t _{str}	3 ms Max.		Measured from the time V _{CC} reaches its rated minimum value, 1.62 V			
Frequency aging	f _{aging}	This is included in frequency tolerance specification.				+25 °C, first year	

*1 Frequency tolerance includes initial frequency tolerance, temperature variation, supply voltage variation, reflow drift, load drift and aging (+25 °C, 1 year).

Pin description

Pin	Name	I/O type	Function	
1	OE	Input	Output enable	High: Specified frequency output from OUT pin Low: Out pin is low (weak pull down), only output driver is disabled.
	ST	Input	Standby	High: Specified frequency output from OUT pin Low: Out pin is low (weak pull down), Device goes to standby mode. Supply current reduces to the least as I _{std} .
2	GND	Power	Ground	
3	OUT	Output	Clock output	
4	V _{CC}	Power	Power supply	



Product Name

SG-9101CGA 170.000000MHz C 20 P J A A A
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

④ Spread type
C: Center spread
D: Down spread

⑦ Operating temperature
J: -40 °C to +125 °C

⑨ Modulation profile
A: Hershey-kiss (default)
B: Sine-wave
C: Triangle

① Model, ② Package type, ③ Frequency,
 ④ Spread type, ⑤ Spread percentage code,
 ⑥ Function, ⑦ Operating temperature,
 ⑧ Modulation frequency, ⑨ Modulation profile, ⑩ Rise/Fall time

② Package Type
CG: 2.5 mm x 2.0 mm

⑥ Function
P: Output enable
S: Standby

⑧ Modulation frequency
A: 25.4 kHz (default)
B: 12.7 kHz
C: 8.5 kHz
D: 6.3 kHz

⑩ Rise/Fall time
A: Default
B: Fast
C: Slow

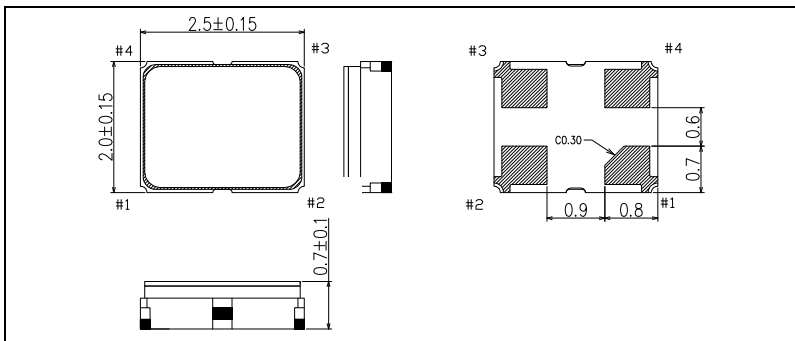
Spread spectrum configuration

④	C: Center spread modulation	⑤ Code	02	05	07	10	15	20
		Spread percentage	±0.25 %	±0.5 %	±0.75 %	±1.0 %	±1.5 %	±2.0 %
	D: Down spread modulation	⑤ Code	05	10	15	20	30	40
		Spread percentage	-0.5 %	-1.0 %	-1.5 %	-2.0 %	-3.0 %	-4.0 %

Modulation frequency: 25.4 kHz (default), 6.3 kHz, 8.5 kHz, 12.7 kHz
 Modulation profile: Hershey-kiss (default), Sine-wave, Triangle

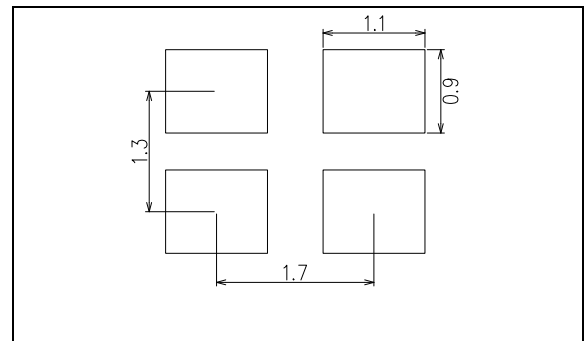
External dimensions

(Unit: mm)



Footprint (Recommended)

(Unit: mm)



Notes:

In order to achieve optimum jitter performance, the 0.1 μF capacitor between V_{CC} and GND should be placed. It is also recommended that the capacitors are placed on the device side of the PCB, as close to the device as possible and connected together with short wiring pattern.

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	► Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
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